General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.

- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.

- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.

- This document is paginated as submitted by the original source.

- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

NASA TECHNICAL MEMORANDUM

NASA TM-75058

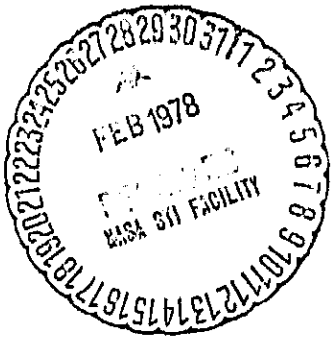
TECHNICAL CHARACTERISTICS AND WORKING CONDITIONS OF LONG-TERM ORBITING "SALYUT"-TYPE SPACE STATIONS

(NASA-TM-75058) TECHNICAL CHARACTERISTICS AND WORKING CONDITIONS OF LONG-TERM ORBITING SALYUT-TYPE SPACE STATIONS (National Aeronautics and Space Administration) 45 p HC A03/MF A01 CSCL 22A G3/15

N78-18097

Unclas 05478

Translation of "Tekhnicheskiye Kharakteristiki I Rabochiye Parametry Dolgovremmenoy Orbital'noy Stantsii Tipa "Salyut", Academy of Sciences USSR, Report, Moscow, 1977, pp 1-42



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546 JANUARY 1978

NASA TECHNICAL MEMORANDUM

NASA TM-75058

TECHNICAL CHARACTERISTICS AND WORKING CONDITIONS OF LONG-TERM ORBITING "SALYUT"-TYPE SPACE STATIONS

(NASA-TM-75058) TECHNICAL CHARACTERISTICS AND WORKING CONDITIONS OF LONG-TERM ORBITING SALYUT-TYPE SPACE STATIONS (National Aeronautics and Space Administration) 45 p HC A03/MF A01 CSCL 22A G3/15

N78-18097

Unclas 05478

Translation of "Tekhnicheskiye Kharakteristiki I Rabochiye Parametry Dolgovremmenoy Orbital'noy Stantsii Tipa "Salyut", Academy of Sciences USSR, Report, Moscow, 1977, pp 1-42

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546 JANUARY 1978

STANDARD TITLE PAGE

1. Report No. NASA TM-75058	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle: Technical Characteristics and Working Conditions of Long-Term Orbiting "Salyut"-Type Space Stations		5. Report Date: January 1978 6. Performing Organization Code
7. Author(s): see article		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address: Transemantics, Inc. 1901 Pennsylvania Ave., NW Washington, DC 20006		11. Contract or Grant No. NASw-2792 13. Type of Report and Period Covered: Translation
12. Sponsoring Agency Name and Address: National Aeronautics and Space Administration Washington, DC 20546		14. Sponsoring Agency Code

15. Supplementary Notes

Translation of. "Tekhnicheskiye Kharakteristiki I Rabochiye Parametry Dolgovremmenoy Orbital'noy Stantsii Tipa "Salyut", Academy of Sciences USSR, Report, Moscow, 1977, pp 1-42

16. Abstract

This document presents the technical characteristics and working conditions of the "Salyut"-type orbiting space stations which affect the selection of preliminary versions of scientific programs and the selection of plans in conjunction with space "shuttle" operations.

17. Key Words (Selected by Author(s))	18. Distribution Statement: Unclassified-Unlimited		
19. Security Classif. (of this report): Unclassified	20. Security Classif. (of this page): Unclassified	21. No. of Pages: 42	22.

NASA-HQ

ACADEMY OF SCIENCES OF THE USSR

COUNCIL ON INTERNATIONAL

COOPERATION IN RESEARCH AND USES OF OUTER SPACE

"INTERCOSMOS"

117901 Moscow, V-71
Leninsky Prospect, 14
Cable address: Moscow, V-71
Intercosmos
Telex: 7564 ANS SU

Tel. 234-38-28

December 30, 1977

Dr. N. Hinners
Assistant Director
National Aeronautics and
Space Administration
U.S.A.

Dear Dr. Hinners:

I am sending you information on the "Salyut" space station as provided for in paragraph 4 of the Summary Document from the talks between specialists from NASA and the Academy of Sciences of the USSR, which took place November 17, 1977.

Respectfully yours,

B. N. Petrov
Academician
Chairman of the
"Intercosmos" Council

Enc: Reference materials in the "Salyut" space station

USSR RD2-005

TECHNICAL CHARACTERISTICS AND WORKING CONDITIONS OF LONG-TERM ORBITING "SALYUT"-TYPE SPACE STATIONS

1977

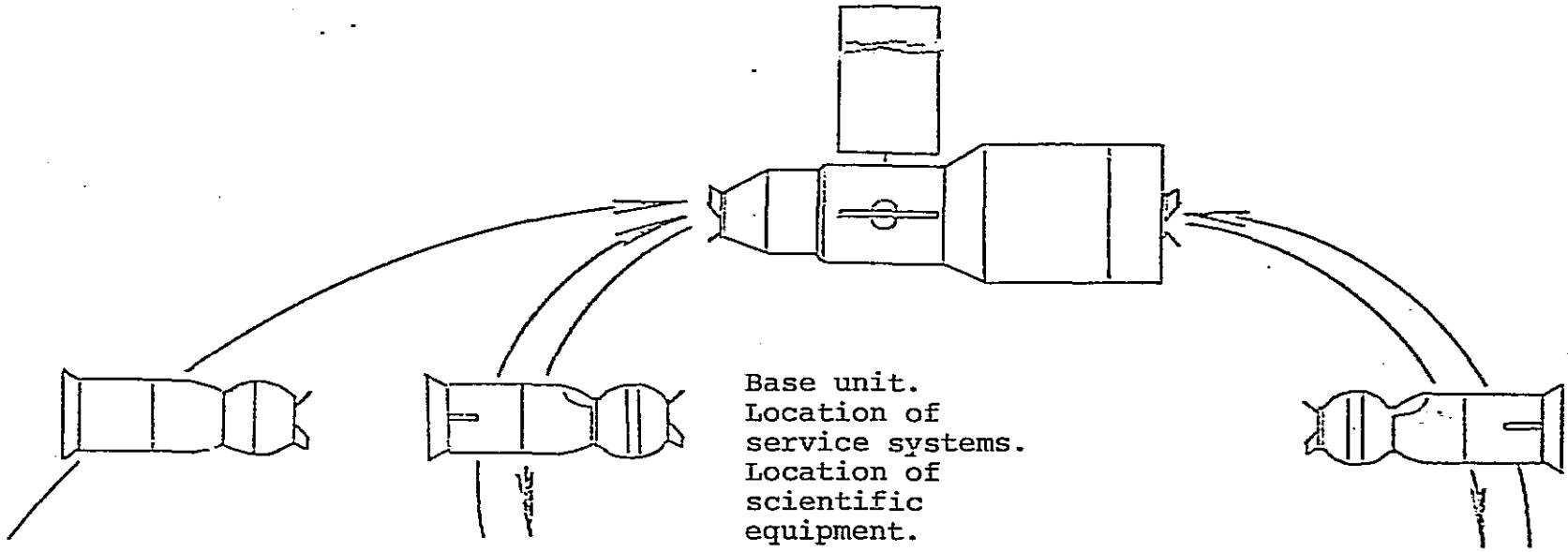
This document presents the technical characteristics /2.
and working conditions of the "Salyut"-type orbiting space stations which affect the selection of preliminary versions of scientific programs and the selection of plans in conjunction with space "shuttle" operations.

CONTENTS

PAGE /3.

1. General Characteristics

1.1. Structure of the "Salyut"-type long-term orbiting space station



Base unit.
Location of service systems.
Location of scientific equipment.

"Soyuz"-type unmanned spacecraft

Delivery of payload and expendable supplies to the station

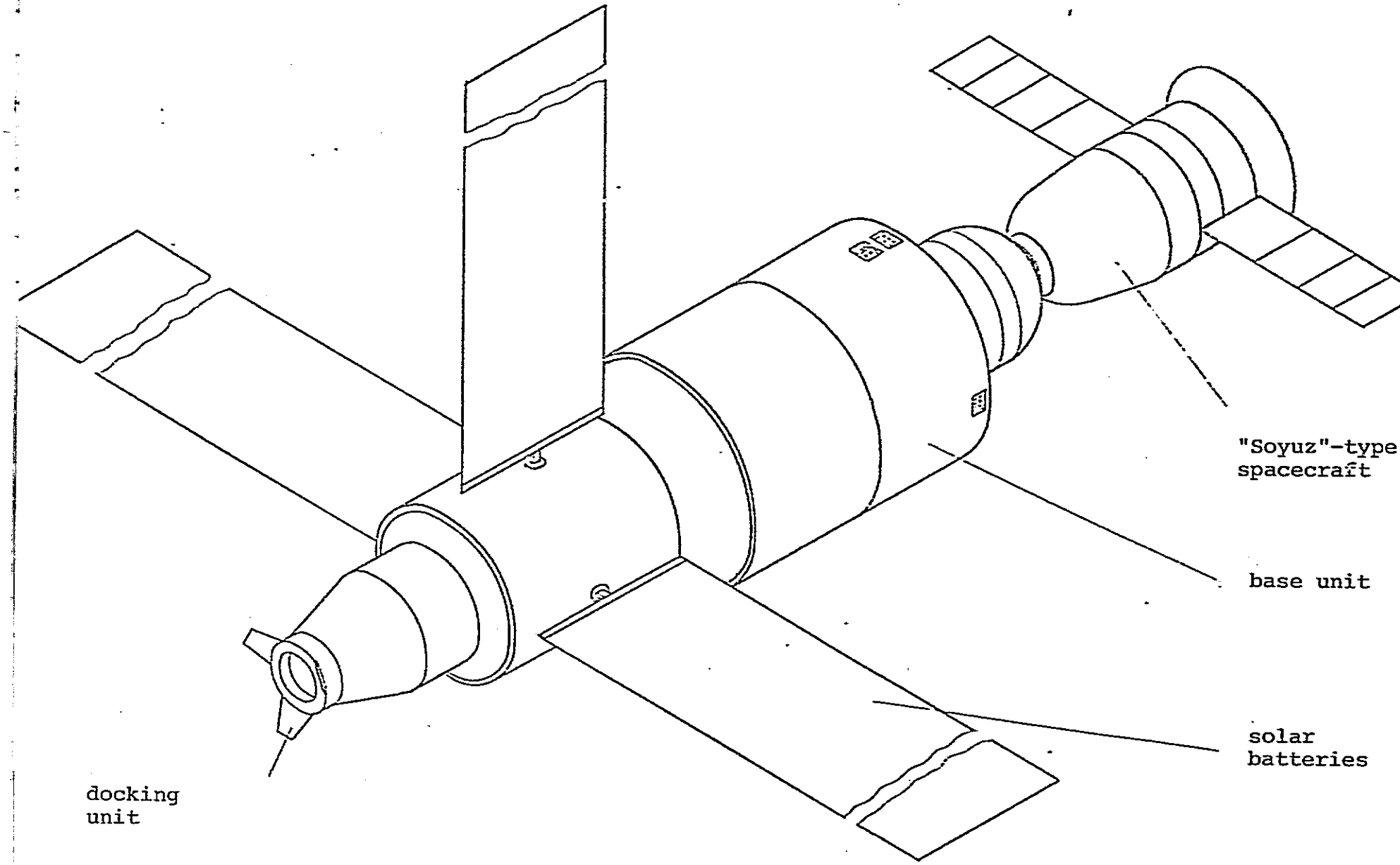
"Soyuz"-type unmanned spacecraft

Delivery of payload to the station.
Return materials with the results of scientific research to earth.

"Soyuz"-type manned spacecraft

Transportation of the crew to the space station.
Return of crew to earth.

1.2. General Structure of the Station

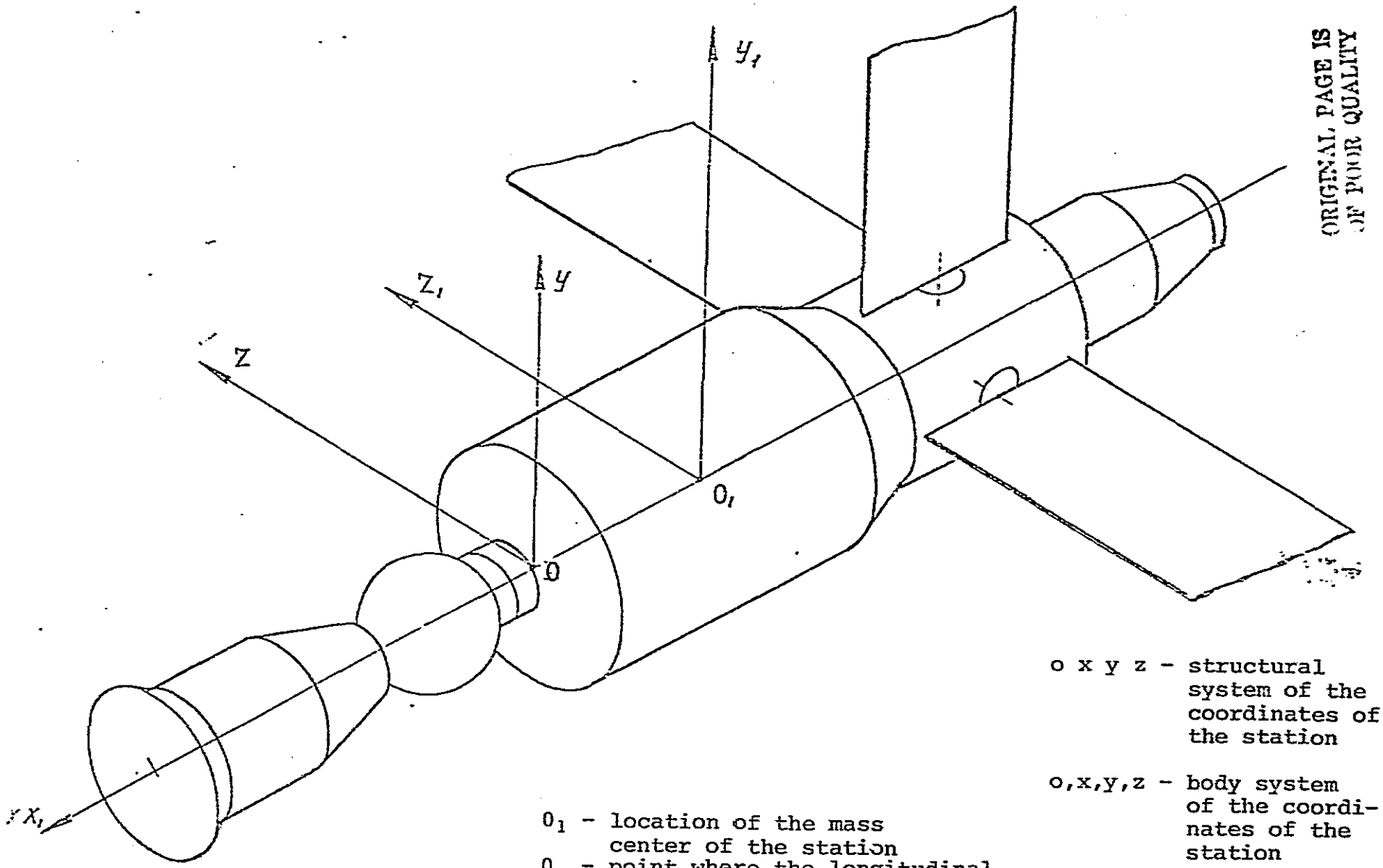


1.3. Geometric Characteristics

/6.

Characteristics or Working Conditions		Note
Item	Value	
1.3.1. Maximal longitudinal dimension of the station, meters	21	
1.3.2. Maximal cross-sectional dimension (along the solar batteries), meters	30-33	
1.3.3. Maximal diameter of the hermetically sealed chamber, meters	4.2	

1.4. Systems of Coordinates



o x y z - structural system of the coordinates of the station

o,x,y,z - body system of the coordinates of the station

O_1 - location of the mass center of the station

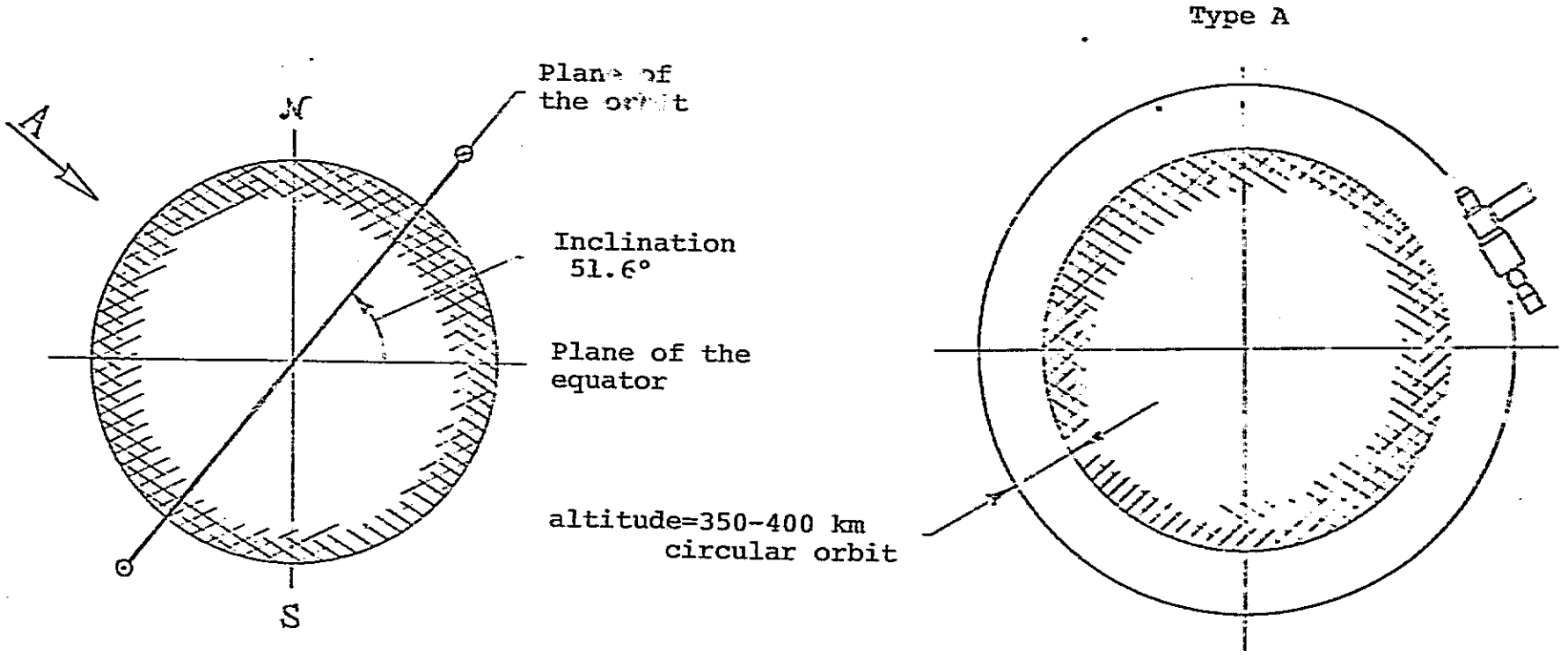
0 - point where the longitudinal axis crosses the base frame

1.5. Mass-Inertia Characteristics

Characteristics or Working Conditions		Note
Item	Value	
1.5.1. Mass of the station, t	26	Mass-inertia characteristics of the "Salyut" station at the moment of docking with the shuttle craft
1.5.2. Maximal moment of inertia of the station, kg m^2		The moments of inertia are computed relative to the mass center of the station
T_x	1.4×10^5	
T_y	1.2×10^6	
T_z	1.2×10^6	
1.5.3. Coordinates of the mass center of the station (for the maximal moment of inertia), m		
X_c	-8.3	
$\lvert Y_c \rvert$	<0.1	
$\lvert Z_c \rvert$	<0.1	

Characteristics or Working Conditions		Note
Item	Value	
1.5.4. Minimal moment of inertia of the station, $kg \cdot m^2$		
T_x	1.4×10^5	
T_y	8×10^5	
T_z	8×10^5	
1.5.5. Mass center coordinates of the station (for the minimal moment of inertia), m		
X_c	-2.7	
$\lvert Y_c \rvert$	<0.1	
$\lvert Z_c \rvert$	<0.1	

1.6. Orbital Parameters of the Space Station



1.7. Time Characteristics

Characteristics or Working Conditions		Note
Item	Value	
1.7.1. Total flight time of the station, years	1.5-2	
1.7.2. Length of the flight in operation "A"	Orbital flight	Operation "A": the "Salyut" station and the "shuttle" craft - two mutually guided but separately flying objects
1.7.3. Length of the flight in operation "B", days	up to 5	Operation "B": "Salyut" station and "shuttle" craft in docked position
1.7.4. Length of flight in operation "C", years	up to 0.5	Operation "C": "Salyut" station operates with scientific equipment, supplied by the "shuttle"

1.8. Crew of the Station

Characteristics or Working Conditions		Note
Item	Value	
1.8.1. Number of crew members	2	

Characteristics or Working Conditions		Note
Item	Value	
1.9.1 Number of crew members who walk in space	2	
1.9.3. Diameter of the passage section in the hatch for exiting into space, m	0.8	

2. INSTALLATION OF SCIENTIFIC EQUIPMENT ON BOARD THE STATION /14.

2.1. Mass of units of scientific equipment transported on the "shuttle"

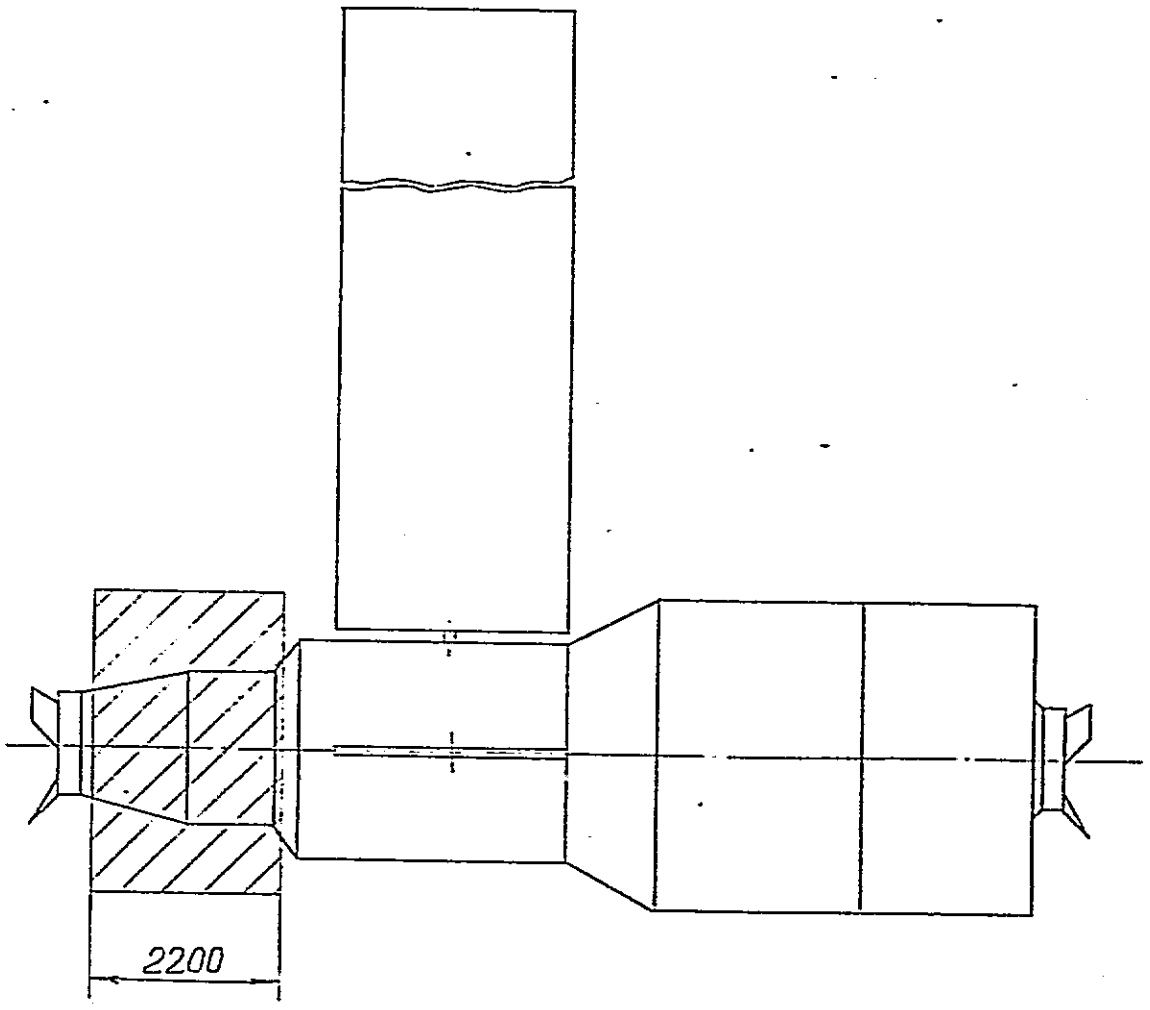
Characteristics or Working Conditions		Note
Item	Value	
2.1.1. Mass of scientific equipment, installed outside the station, t	5 - 10	
2.1.2. Mass of scientific equipment installed inside the space station	up to 0.5	

2.2. Overall Dimensions of Units of Scientific Equipment /15.

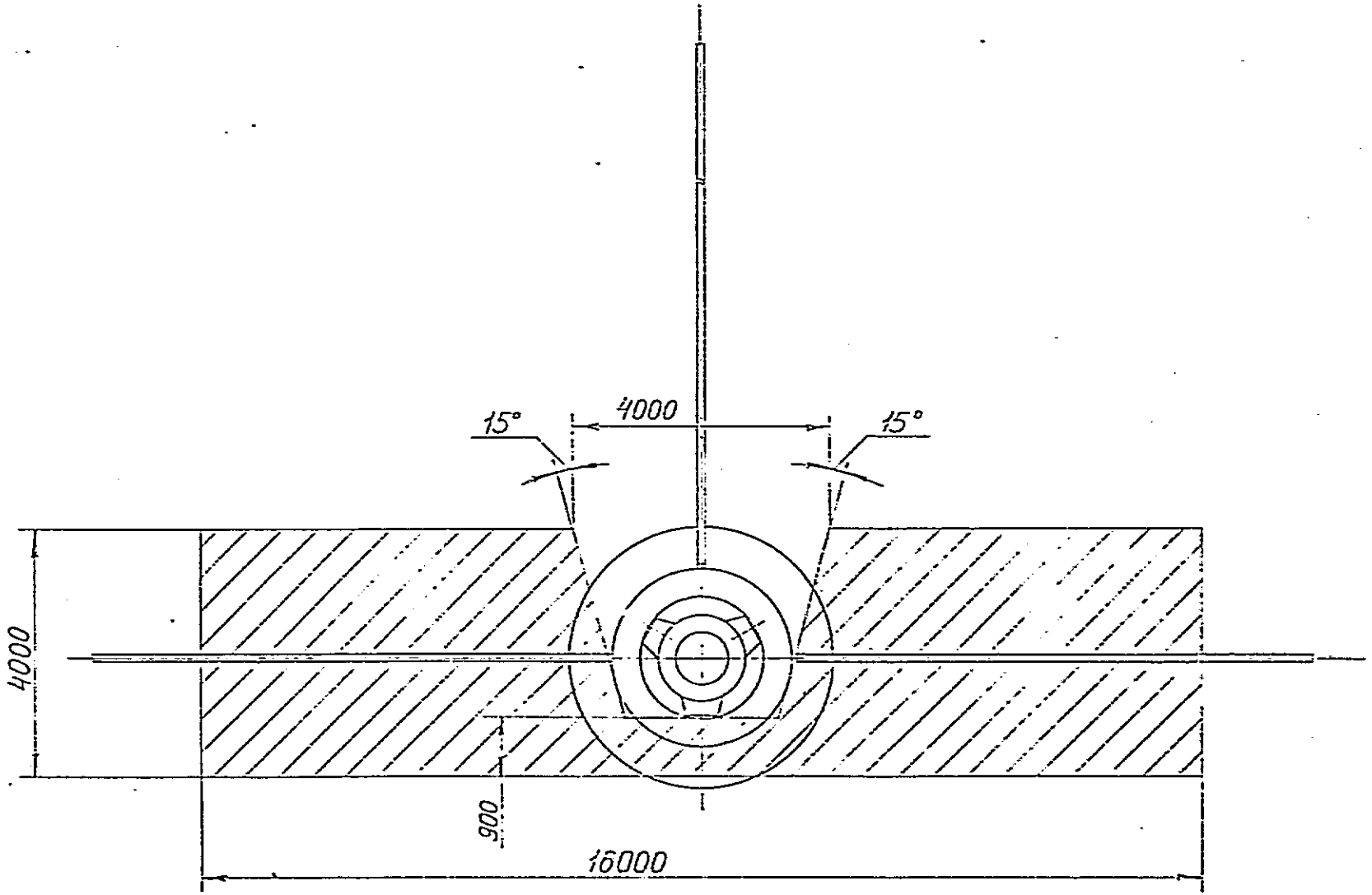
Characteristics or Working Conditions		Note
Item	Value	
2.2.1. Maximal dimensions of scientific equipment installed on the outside of the station:		
cross-sectional dimensions, m	4 x 2.2	
length, m	up to 16	
2.2.2. Maximal dimensions of scientific equipment installed inside the station:		
diameter, m	0.6	
length, m	0.6	

2.3. Possible Locations for the Scientific Equipment Transported by the "Shuttle" craft (Variation I)

/16.

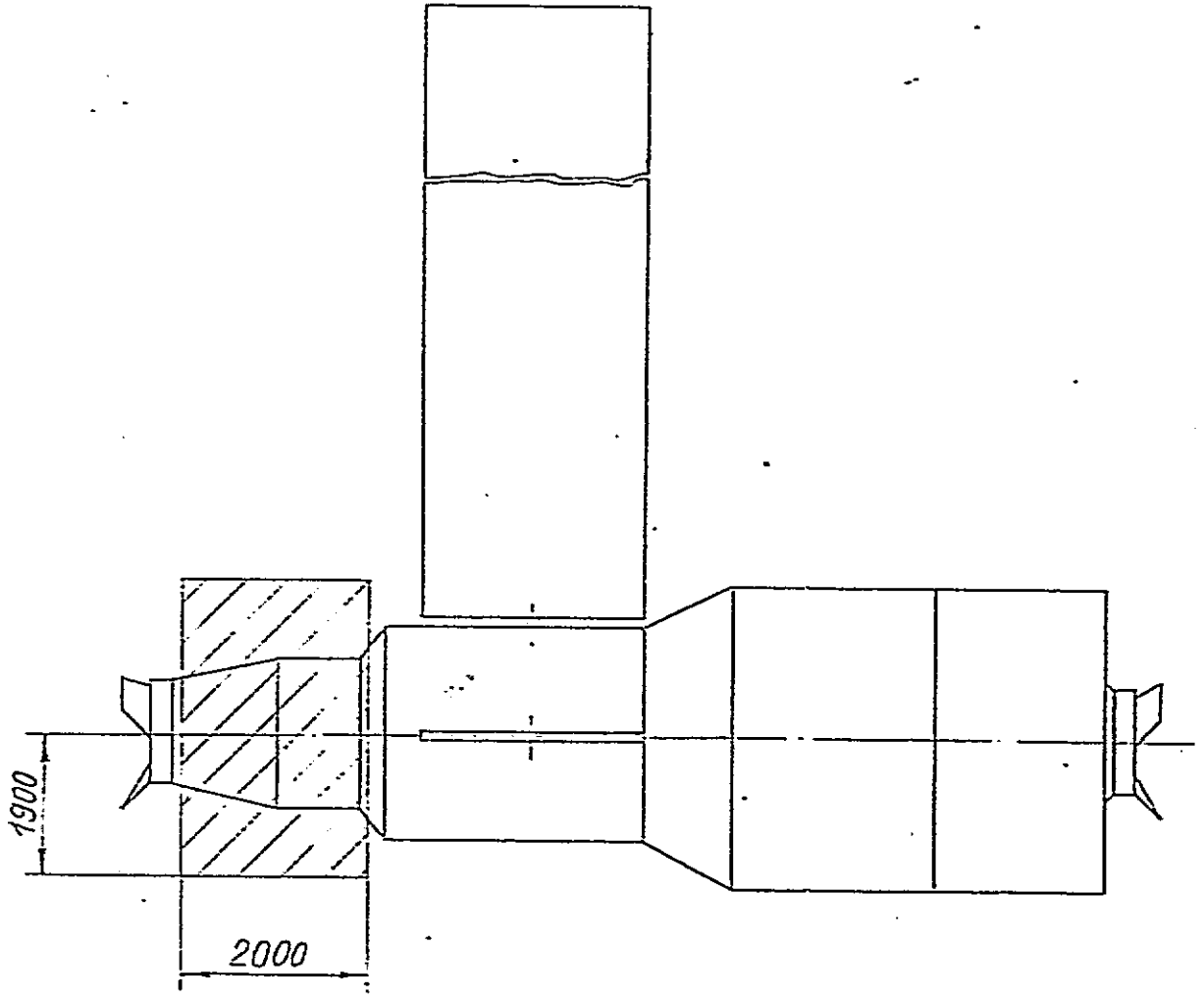


2.3. Possible Locations for the Scientific Equipment Transported by the "Shuttle" Craft (Variation I). Continued.

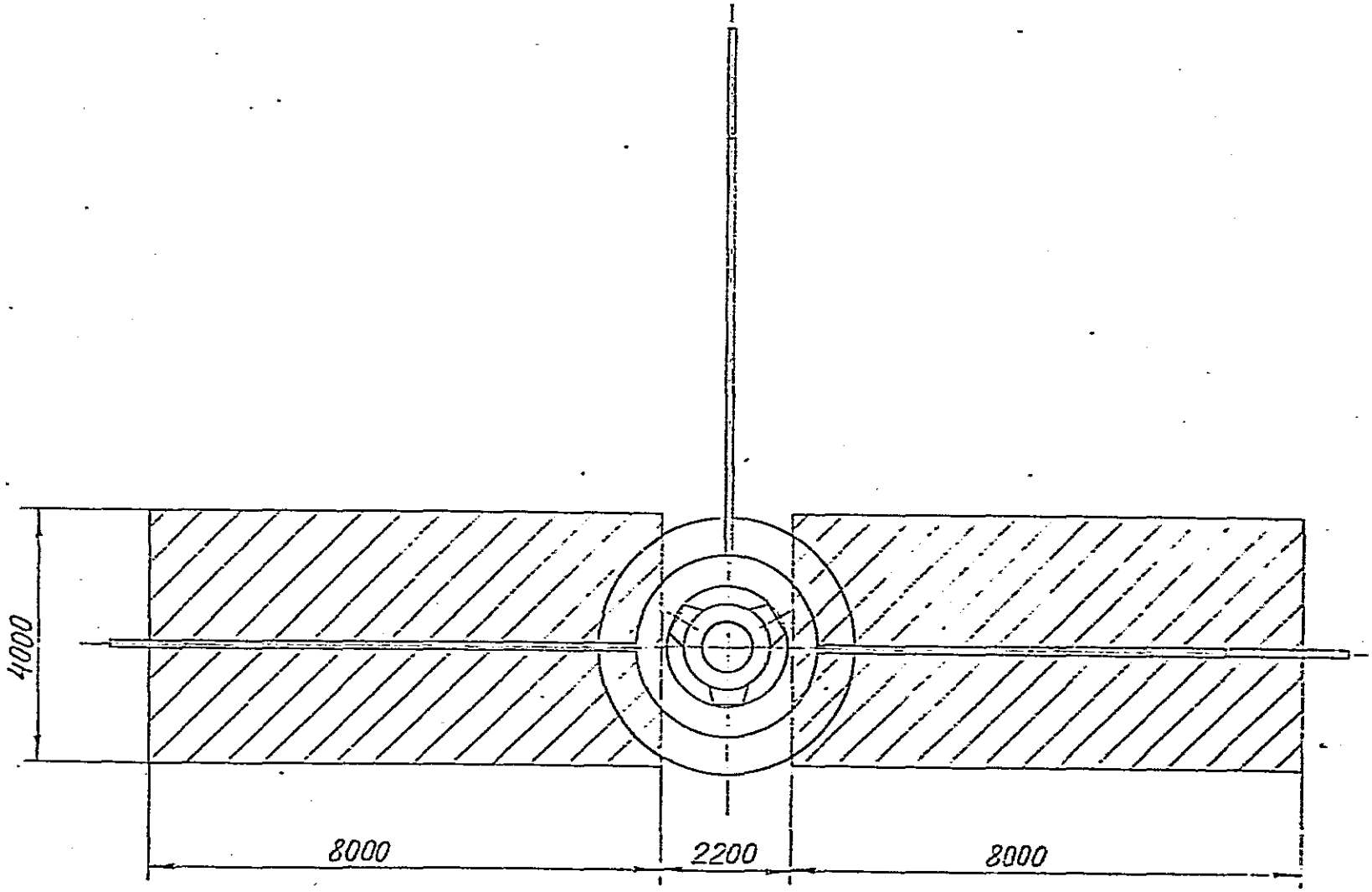


2.3. Possible Locations for the Scientific Equipment Transported by the "Shuttle" Craft. (Variation 2).

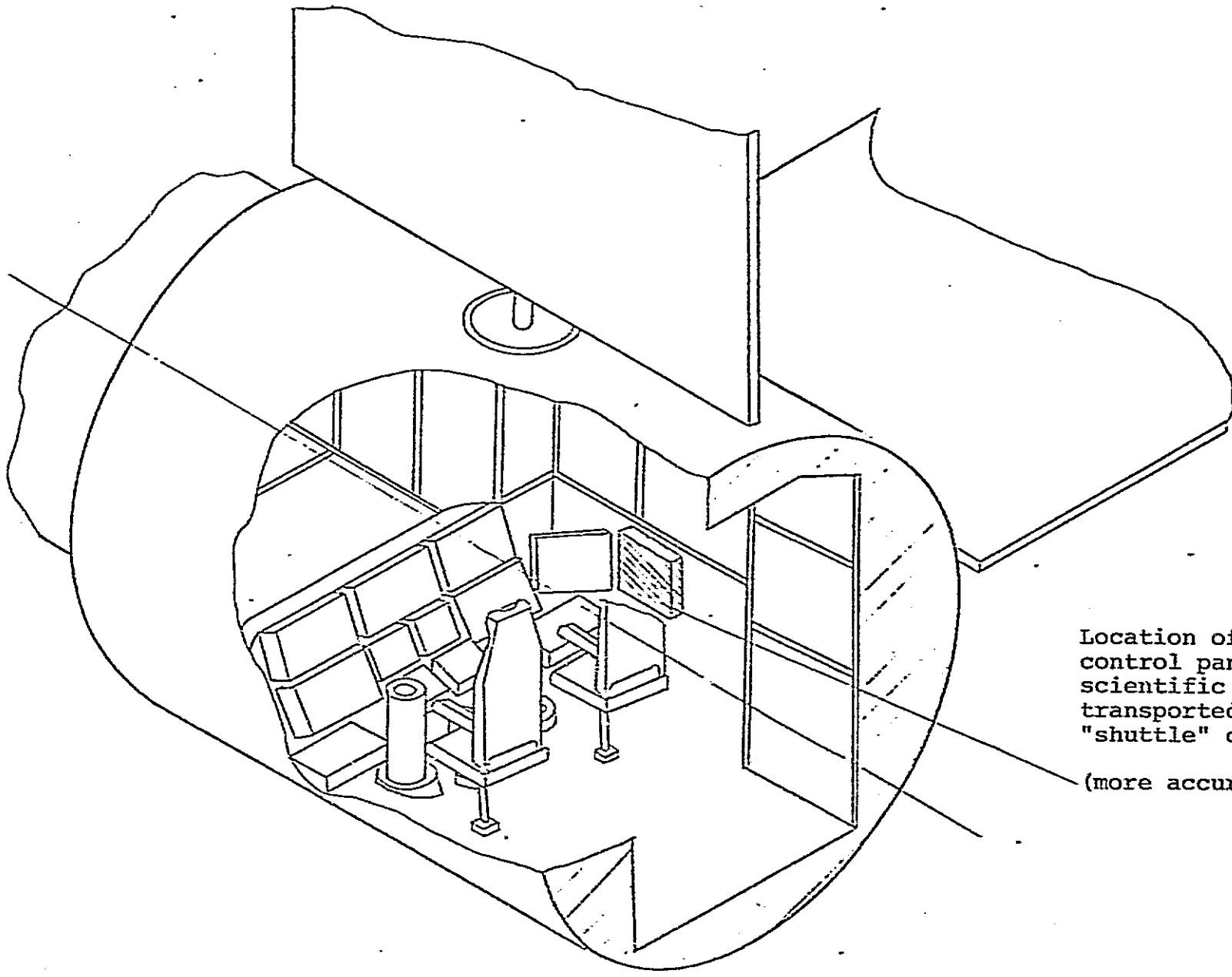
/18.



2.3. Possible Locations for the Scientific Equipment Transported by the "Suttle" Craft (Variation 2). Continuation.



2.4. Control Post for the "Salyut" Station

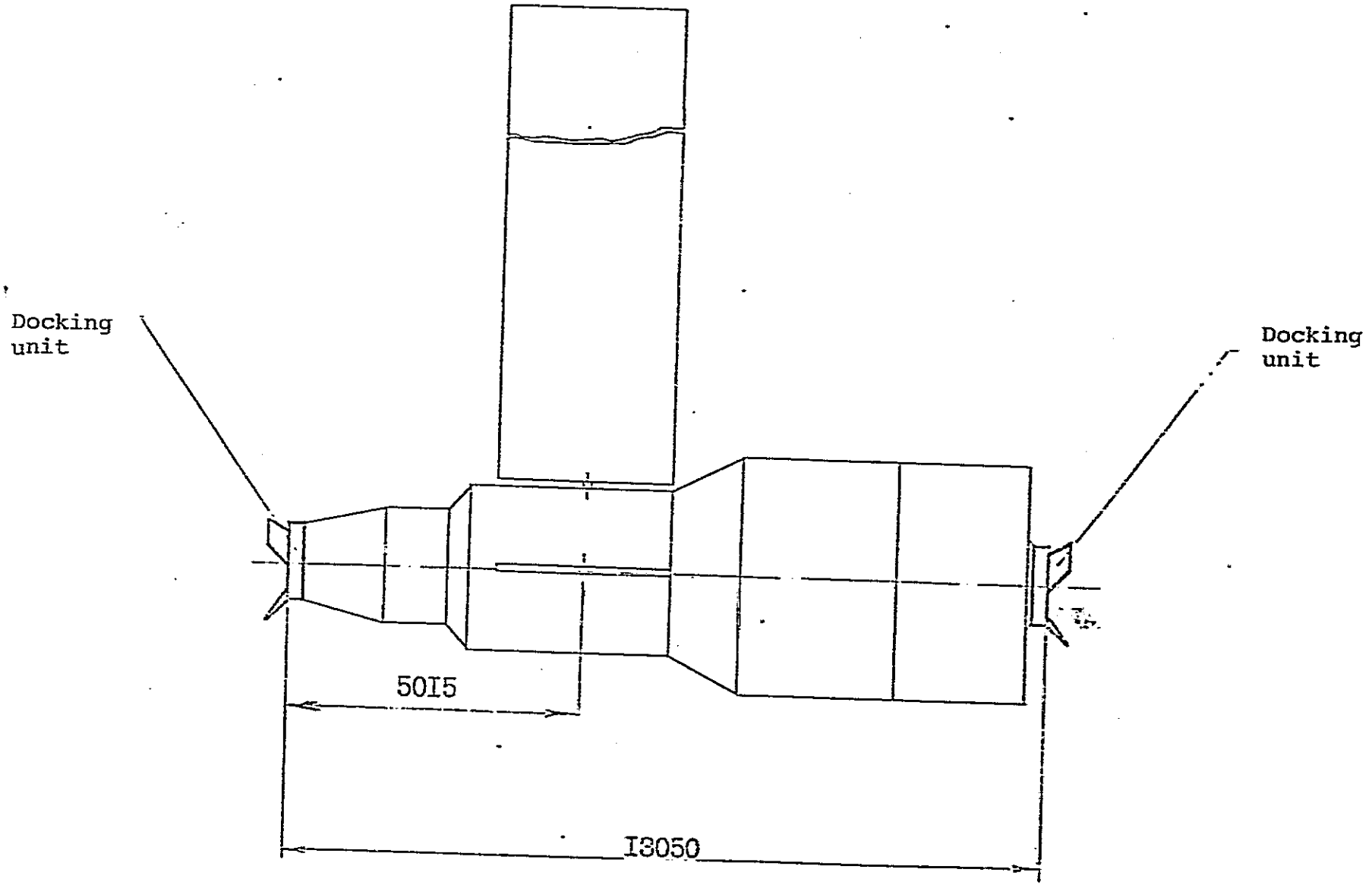


3. DOCKING UNITS

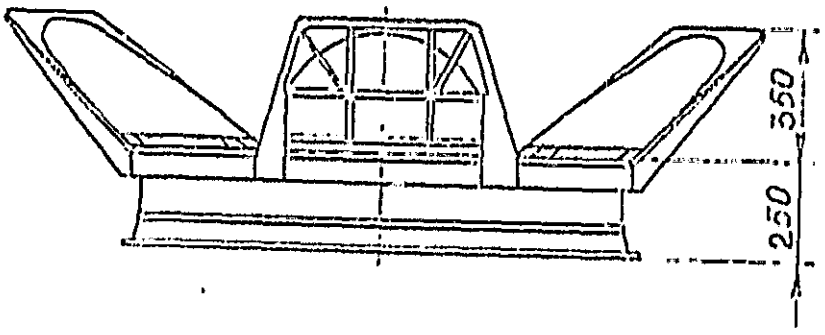
3.1. Type of Docking Units and Location of Electrical Plug and Socket Units

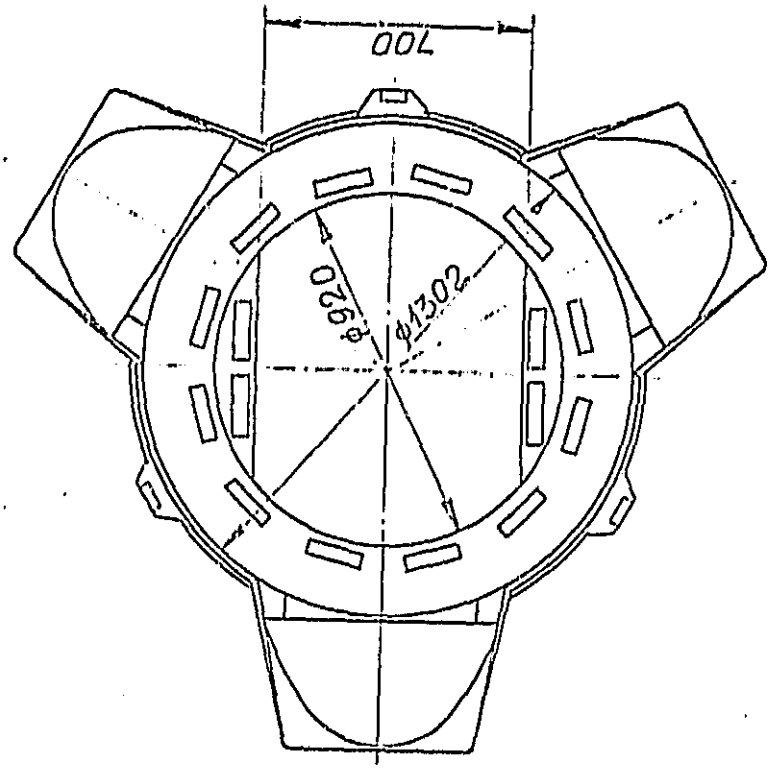
Characteristics or Working Conditions		Note
Item	Value	
3.1.1. Type of docking unit	Peripheral	
3.1.2. Location of the electrical plug and socket units	Inside the duct	Manual and Automatic engagement of the electrical plug and socket units is possible

3.2. Location of the Docking Units of the Station



3.3. Design and Characteristic Dimensions of the Docking Units





ORIGINAL PAGE IS
OF POOR QUALITY

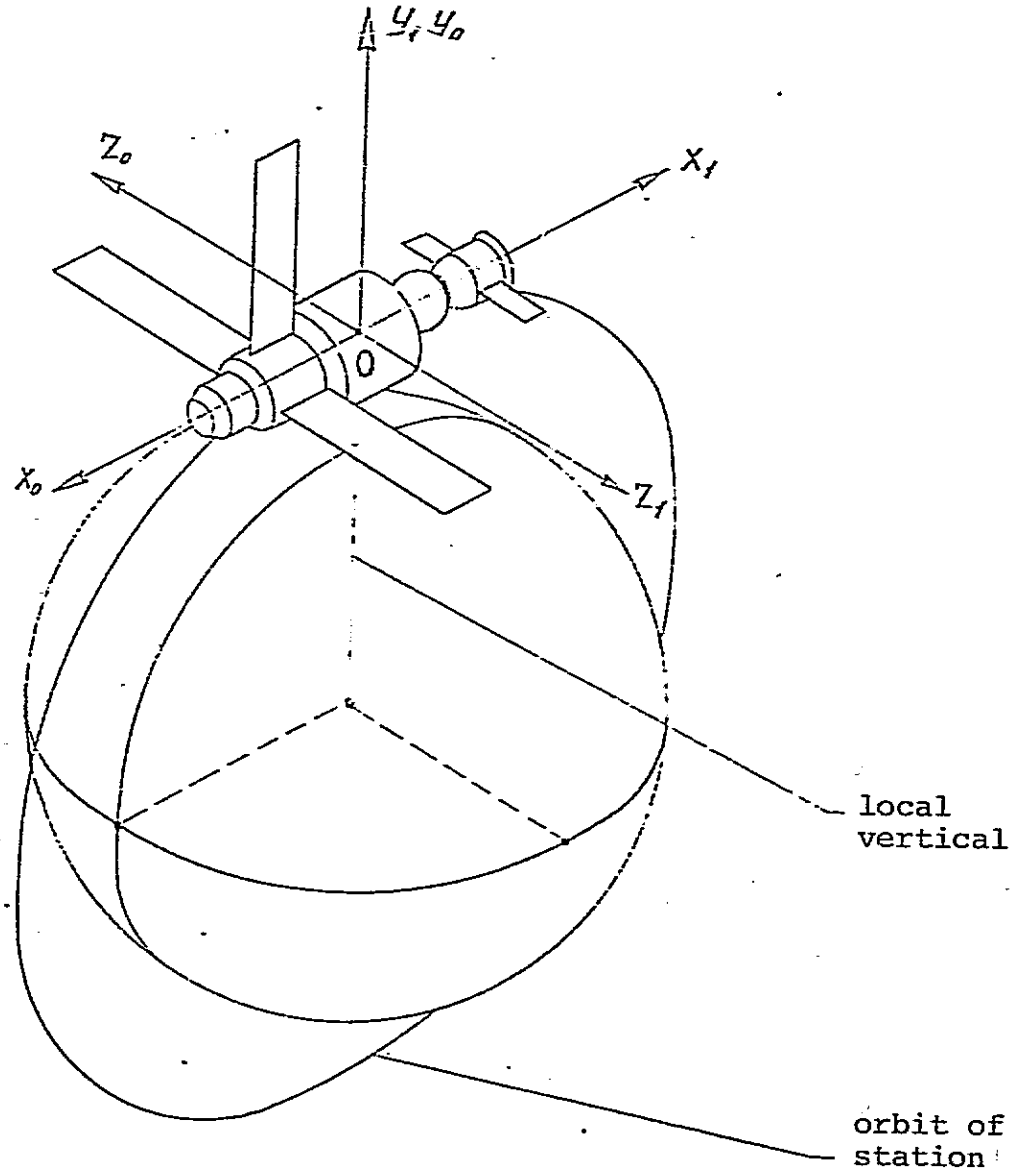
4. ORIENTATION OF THE STATION RELATIVE TO THE MASS CENTER AND STABILIZATION

4.1. Provision for Orientation

Characteristics and Working Conditions		Note
Item	Value	
4.1.1. Operation "A"	"Salyut" station - orientation relative to the mass center	"Shuttle craft - relative position of the mass center and orientation relative to the mass center
4.1.2. Operation "B"	Has to be determined	
4.1.3. Operation "C"	The "Salyut" station insures orientation	

4.2. Orbital orientation of the Station. Operation I.

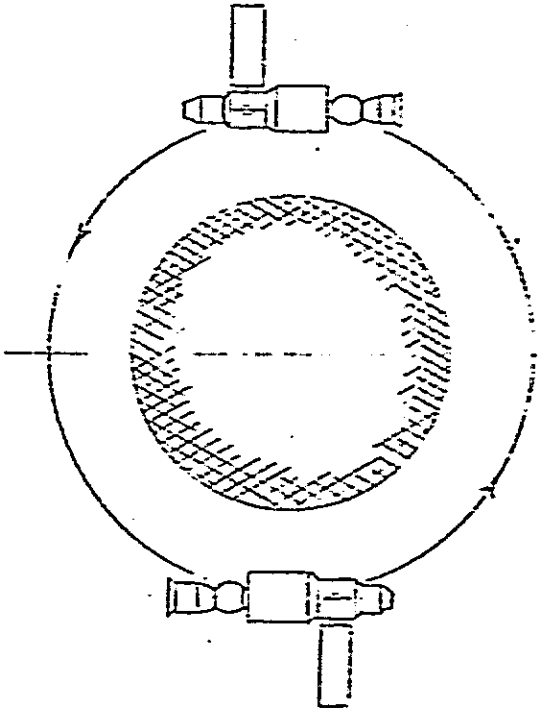
/25.

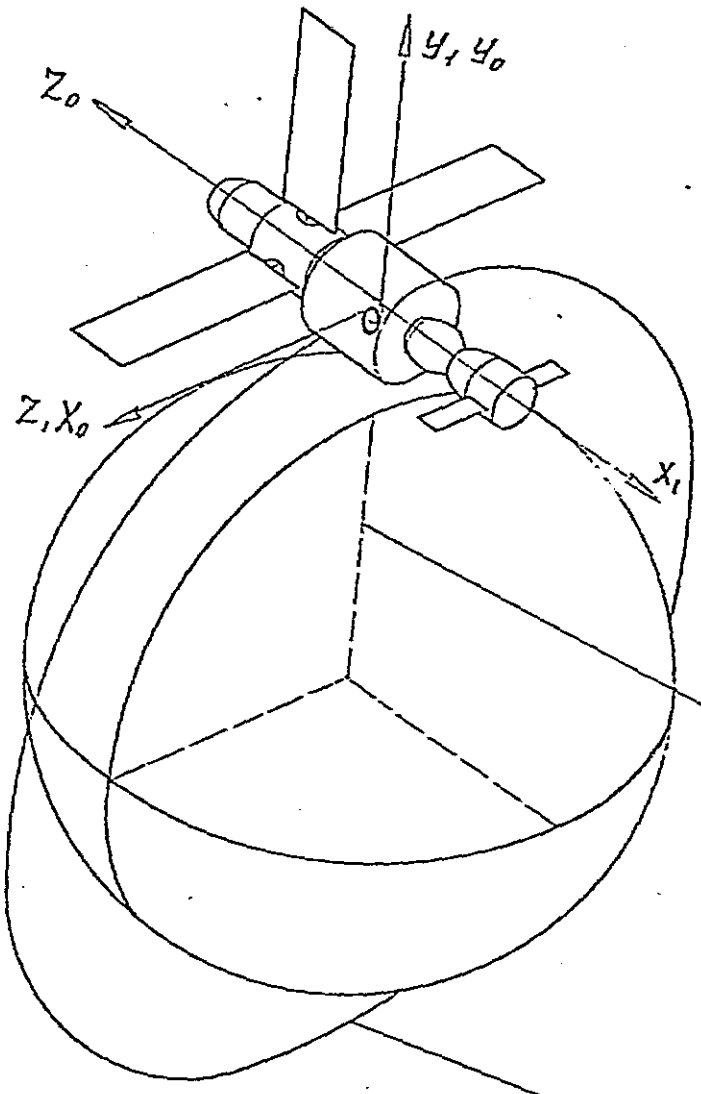


O $X_1Y_1Z_1$ - combined system of the station coordinates

O $X_0Y_0Z_0$ - orbital system of the coordinates

0 - mass center of the station

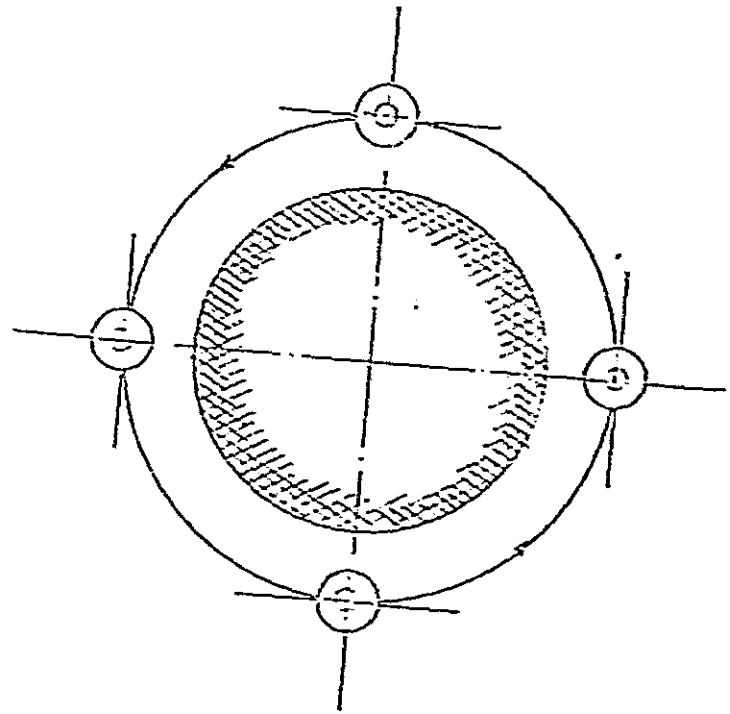




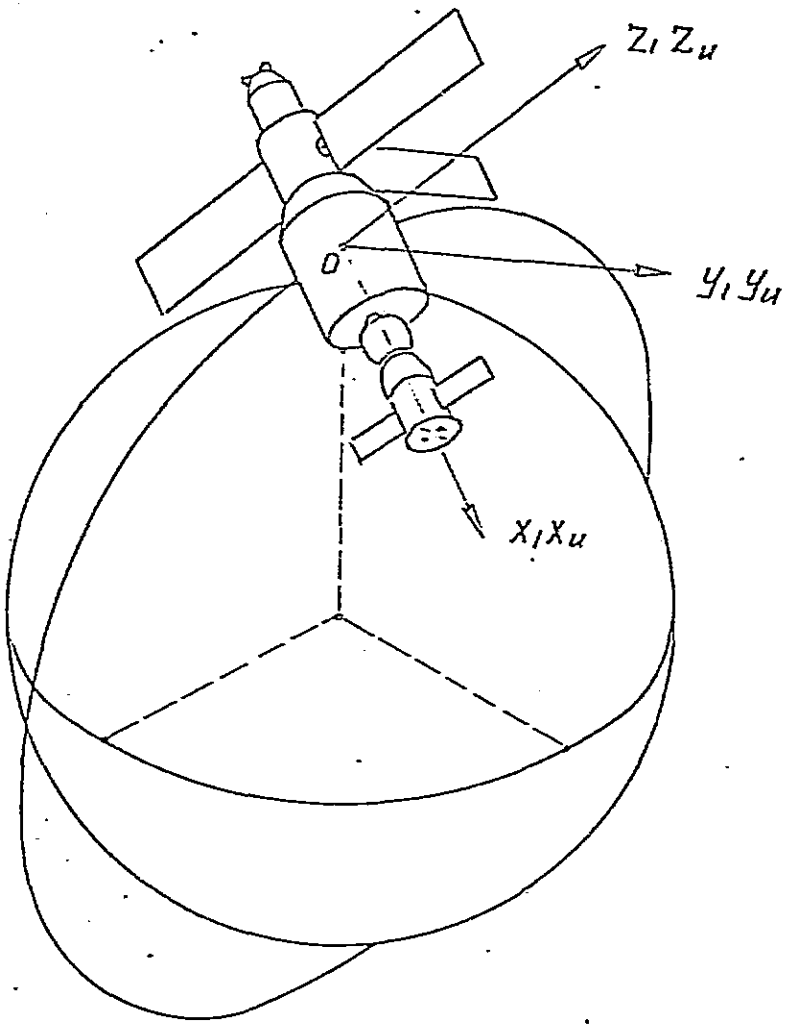
$O X_1 Y_1 Z_1$ - combined system of the station coordinates

$O X_0 Y_0 Z_0$ - orbital system of the coordinates

0 - mass center of the station

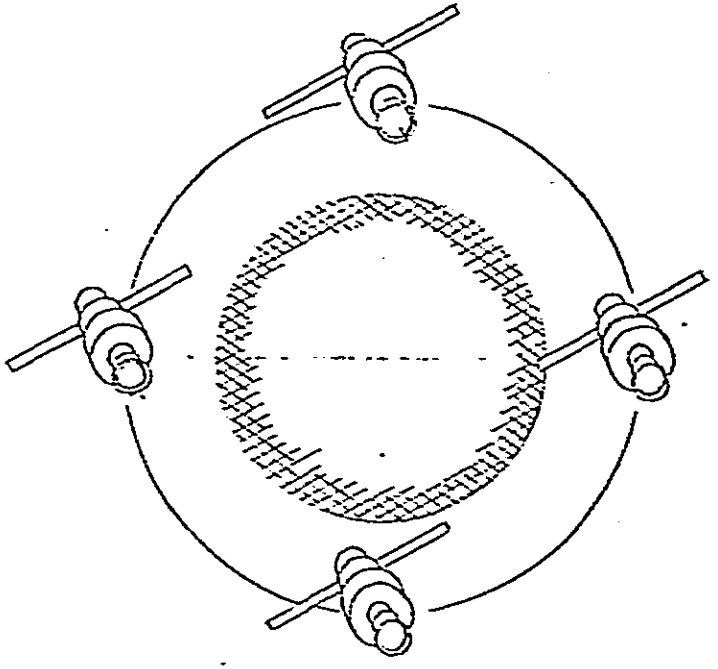


4.3. Inertia Orientation of the Station



O $X_1 Y_1 Z_1$ - combined system of the station coordinates

O $X_u Y_u Z_u$ - inertia system of the coordinates

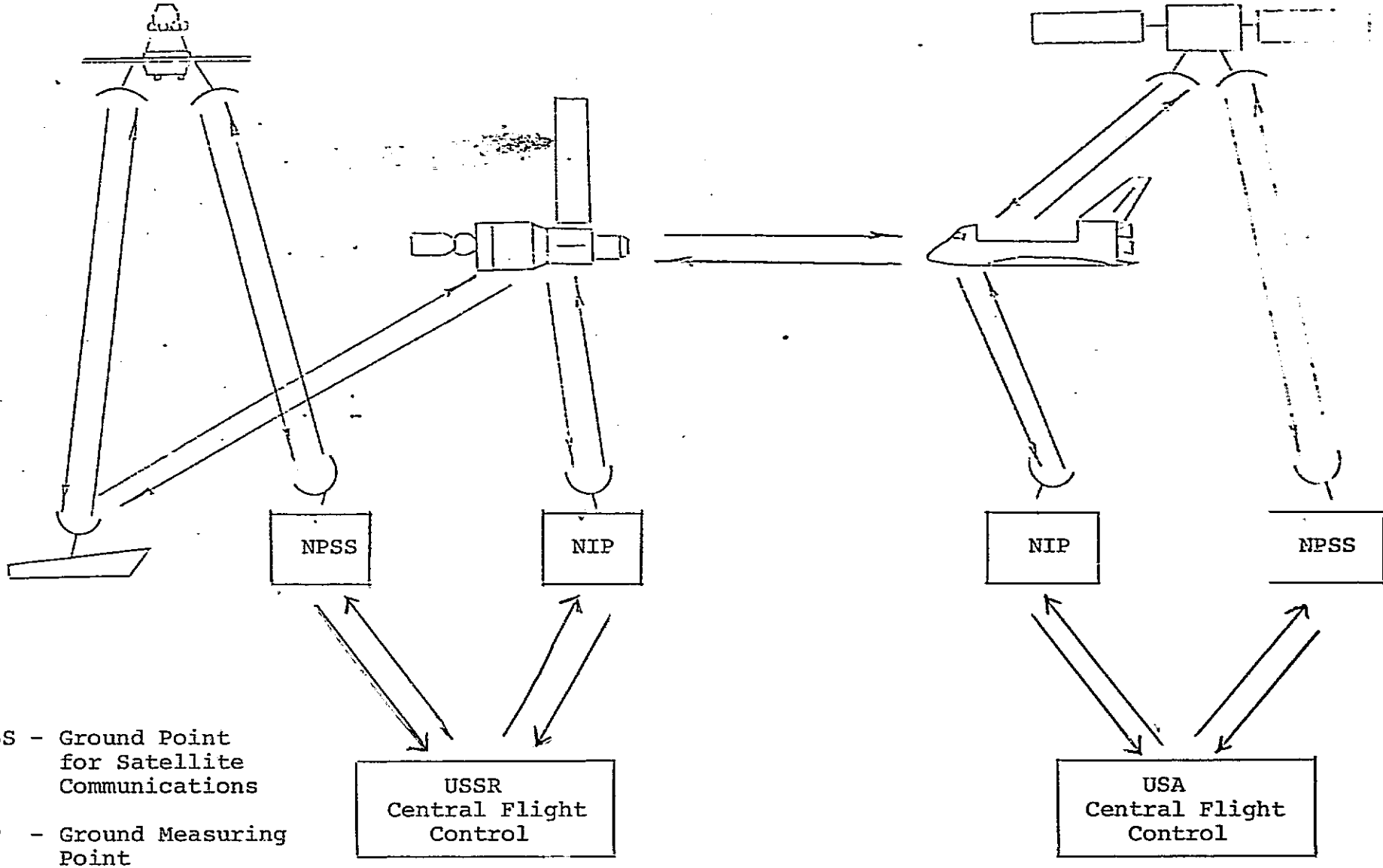


4.4. Accuracy of the Orientation Operations of the Station /28.

Characteristics or Working Conditions		Note
Item	Value	
4.4.1. Accuracy of orbital orientation of the station, angle minute	±50	
4.4.2. Accuracy of the inertia orientation, angle minute	±10	

Characteristics or Working Conditions		Note
Item	Value	
4.5.1. Time of constant guidance, minutes	20-50	
4.5.2. Time for long-term guidance with periodic suspension of the assigned orientation (with a period of succession of the rotation period of the station), days.	up to 30	In operation "C"

5. Diagram of Communications for the "Salyut" Station



NPSS - Ground Point for Satellite Communications

NIP - Ground Measuring Point

6. Power Supply for the Scientific Equipment /31.

6.1. Power Yield

Characteristics and Working Conditions		Note:
Item	Value	
6.1.1. Average daily power yielded for supplying the scientific equipment, kilowatts	0.5-3	Depending on the location of the orbit relative to the sun and the orientation operation of the station

Characteristics and Working Conditions		Note
Item	Value	
6.2.1. Nominal power voltage on the busbars of the scientific equipment, Volts	27	Direct Current Voltage dispersion from the nominal is to be defined.

7. MAINTENANCE OF THE HEAT CONDITIONS FOR THE SCIENTIFIC EQUIPMENT

7.1. Temperature Range

Characteristics or Working Conditions		Note
Item	Value	
7.1.1. Temperature range in hermetically sealed sections, °C	15-25	In the living quarters of the station

Characteristics or Working Conditions		
Item	Value	Note
7.2.1. Removal and disposal of heat from the units of scientific equipment, installed on the outside of the station	By means of the units of the scientific equipment	
7.2.2. Heat removal from the scientific equipment installed inside the station	Ventilation with a stream of air	Temperature in the instruments' zone 0 ÷ 40°C

8. ATMOSPHERIC CHARACTERISTICS IN THE HERMETICALLY SEALED COMPARTMENTS

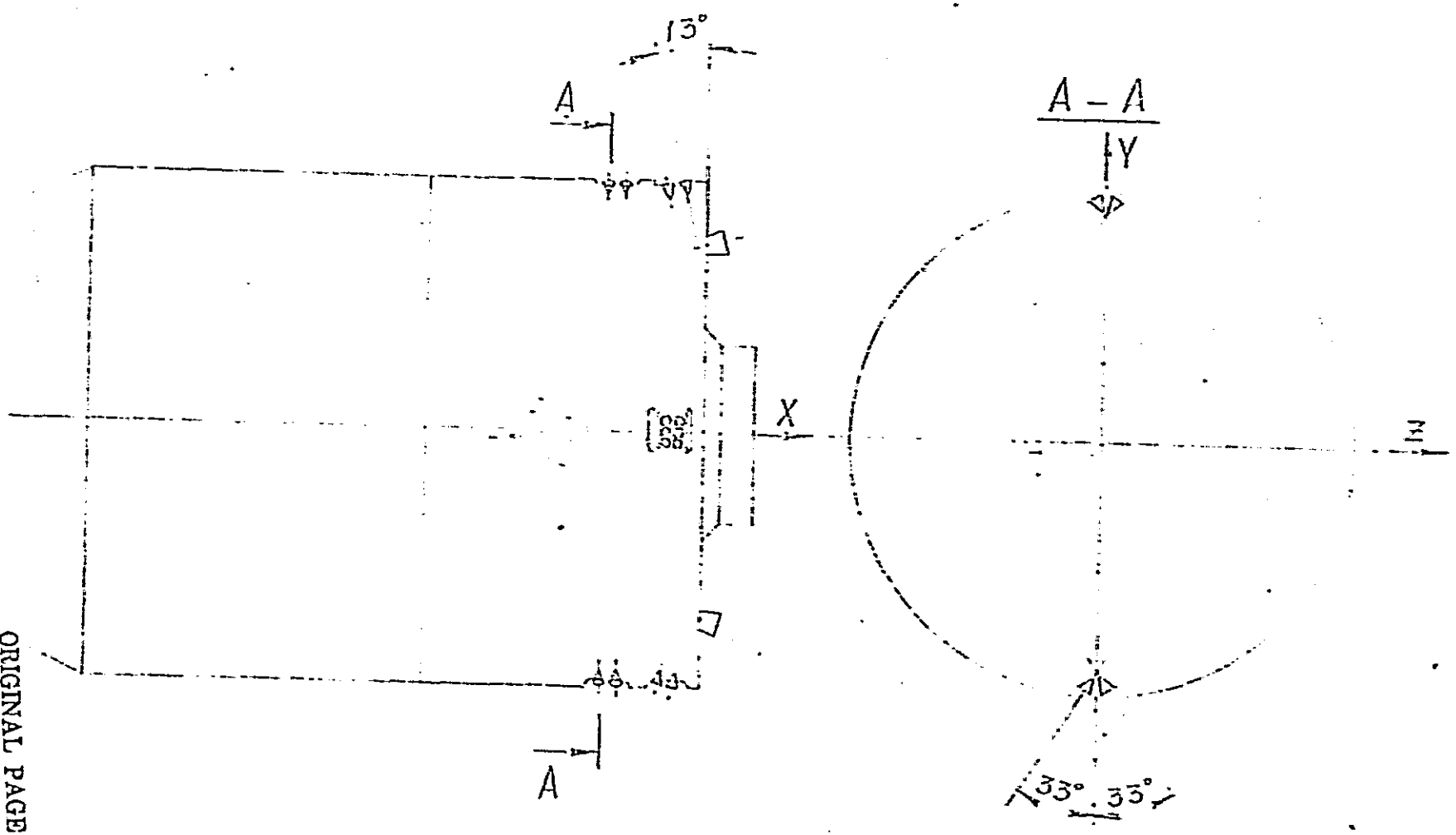
8.1. Volume

Characteristics or Working Conditions		
Item	Value	Note
8.1.1. Volume of the hermetically sealed compartments of the station at the moment of docking with the "shuttle" craft, m^3	100	

Characteristics and Working Conditions		Note
Item	Value	
8.2.1. Total pressure in the hermetically sealed compartments, mm mercury column	490-960	
8.2.2. Partial oxygen pressure, mm mercury column	510-200	
8.2.3. Carbon dioxide partial pressure (not more than) mm mercury column	7	
8.2.4. Partial pressure of water vapors, mm mercury column	8-13	

9. REACTIVE CONTROL INSTRUMENTS

9.1 Outline of the Location of the Engines



9.2. Fuel Components of the Reactive Control Instruments /38.

Characteristics or Working Conditions		Note
Item	Value	
9.2.1. Fuel	Unsymmetrical Dimethyl-hydrazine	
9.2.2. Oxidizing agent	Nitrogen tetroxide	

10. CHARACTERISTICS OF FLIGHT TIME

10.1. Stability and Accuracy of Coordination

Characteristics or Working Conditions		Note
Item	Value	
10.1.1 Stability of flight time	5×10^{-7}	For the entire flight time of the station
	10^{-9}	For 36 hours flight time of the station
10.1.2. Accuracy of coordinating flight time with ground time, milliseconds	±50	

11. RENDEZVOUS AND DOCKING CHARACTERISTICS OF THE "SALYUT" SPACE STATION AND THE "SHUTTLE" CRAFT

11.1. Distribution of Functions and Orientation Operation

Characteristics or Working Conditions		Note
Item	Value	
11.1.1. Function of the "Salyut" station during rendezvous	Passive craft	
11.1.2. Orientation operation of the "Salyut" station during rendezvous with the "shuttle"	Stabilization on the transducers of the angular speeds	Angular speeds along each axis $\leq$ 0.06 degree/sec

11.2. Parameters of Movement of the "Shuttle" craft Relative to the Station Which Should Be Considered For the Development of the Docking Unit and Other Structural Elements

Characteristics or Working Conditions		Note
Item	Value	
11.2.1 Rendezvous speed, Meters/sec	0.05-0.152	The data correspond to the "Summary Document" of the meeting of specialists from NASA and the Academy of Sciences of the USSR, October, 1973, Moscow
11.2.2 Lateral velocity component m/sec	0±0.061	
11.2.3 Lateral misalignment, m	0±0.229	
11.2.4 Angular misalignment, degrees	0±6	
11.2.5 Bank turn, degrees	0±5	

Characteristics or Working Conditions		Note
Item	Value	
11.2.6. Angular speed for the active craft, degrees/sec	0 ± 0.3	
11.2.7. Angular speed for the passive craft, degrees/sec	0 ± 0.3	